

Physical Training for Climbing

Guidance Notes

1. Demands of the Sport
2. Energy Production
3. Physiology and Anatomy
4. Principles of Training
5. Practical Examples
6. Weekly Session Plans



1. Demands of The Sport

- 1.1 Specificity
- 1.2 Time verses Intensity

2. Energy Production

- 2.1 Key Principles of Aerobic and Anaerobic Systems
- 2.2 Relationship between intensity and metabolism

3. Physiology and Anatomy

- 3.1 The Cardiovascular System
- 3.2 The Respiratory System
- 3.3 Muscle Groups
- 3.4 Anatomy of Fingers and Forearm
- 3.5 Peak Height Velocity and Growth Spurts

4. Principles of Training

- 4.1 How to create adaptation
- 4.2 Different types of training
- 4.3 The perceived fatigue scale and training guidelines

5. Practical Examples

- 5.1 General Conditioning
- 5.2 Strength Training
- 5.3 Strength Endurance Training
- 5.4 Endurance Training

6. Weekly Session Plans

- 6.1 Examples of weekly session for different groups.

1 Demands of The Sport

1.1 Specificity

Discussion will take place regarding the nature of climbing and what it is as a sport and what are its characteristics. Examples will be used from other sports for comparison. The characteristics of climbing will be considered and then the Provider will highlight those characteristics that constitute Physical Aspects, rather than Tactical, Mental or Technical. The demands of the sport and the characteristics of the participants will be highlighted and why a coach needs to know this explained.

1.2 Time verses Intensity

The concept of time verses intensity will be introduced. Where climbing fits into the graph of time verses intensity as maximal effort will be shown and the correlation between this and energy systems introduced.

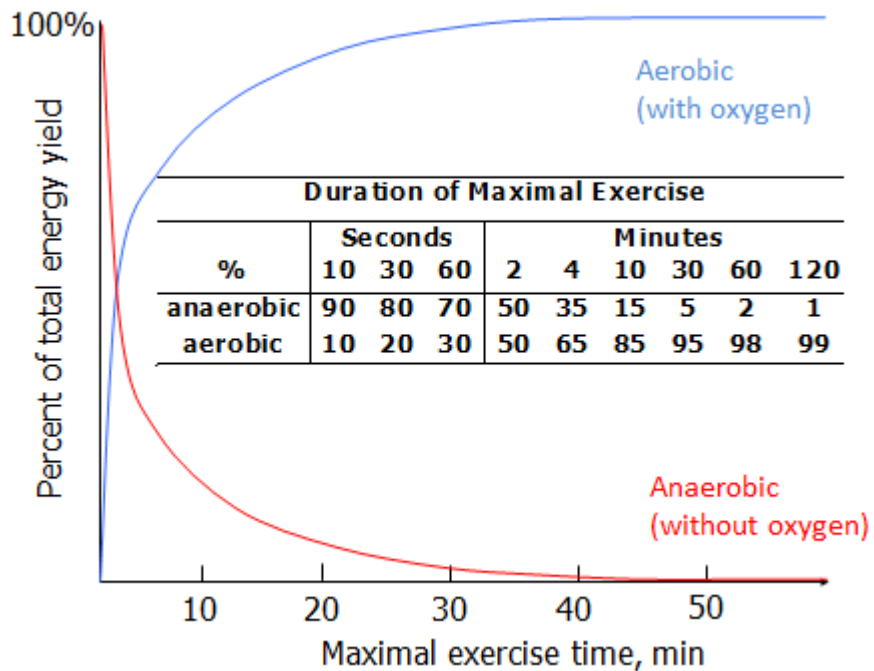
2 Energy Production

2.1 Key Principles of Aerobic and Anaerobic Systems

A basic introduction to the aerobic and anaerobic energy systems will be made. Aerobic- oxygen required, low intensity long duration. Anaerobic- does not require O2, high intensity, short duration.

2.2 Relationship between intensity and metabolism

The relationship between intensity and time and the energy systems will be explained. Different types of climbing will require the use of different types of energy systems and the split / timings for



this will be shown.

3. Physiology and Anatomy

3.1 The Cardiovascular System

The two primary energy systems that the human body uses are explained. The CV System using primarily the heart, supplies the blood which contains – water, nutrients and oxygen, these elements are vital for energy to be produced in the muscles. It also transports away waste products e.g. carbon dioxide and lactate. The CV system provides far more oxygen than the muscles can use in climbing. However when muscles contract they obstruct the flow of blood which in turn hinders aerobic metabolism. Through effective training a climber will adapt by allowing a greater quantity of oxygen to pass to the working muscle between muscle contractions.

3.2 The Respiratory System

The respiratory system is the method to bring oxygen into the body and transporting CO₂ and water out using the lungs. The CV system then takes the O₂ and CO₂ to and from the muscles. This allows us to produce energy = muscle contraction Both the CV system and the respiratory system transport more O₂ and CO₂ than your climbing specific muscles need. Given that climbing does not significantly stress the respiratory system then this is not considered to be a limiting factor.

3.3 Muscle Groups

The main muscle groups used in climbing will be discussed and which have to work the most and which groups are limiting factors regarding climbing performance. The antagonistic muscles as well as the primary muscles the agonists will be highlighted.

3.4 Anatomy of Fingers and Forearm

The relationship between the forearm and the fingers will be explained showing the muscles, tendon, bone, joint and ligament structures. An awareness of injury prevention dependant on maturation will be described and adaptation and injury rehabilitation discussed.

3.5 Peak Height Velocity and Growth Spurts

A re-emphasis of the warming up principals and the possible period of sensitivity around a growth spurt will be reiterated from Fundas 1 and Fundas 2 using the Peak Height Velocity Growth Charts.

4. Principles of Training

4.1 How to create adaptation

How you create adaptation is be described using; overload, progression, rest/recovery regression super-compensation. Your training needs to progressively overload your body in order to improve performance. You must also monitor and assess your performance as well as provide adequate recovery.

Phase I Training stimulus

The initial training session or increased environmental stress causes a reduction in our ability to perform

Phase II Recovery

Resting or taking active rest enables the body to re-establish its internal environment, adjust and repair itself thereby allowing the physical performance to return to the starting level

Phase III Super-Compensation

Performance surpasses the initial level as the body readjusts to the new training stimulus. The climber can now tolerate the same load as before but with less apparent feelings of fatigue

Phase IV Detraining

If successive exposure to the new stimulus does not occur in time, then the gains in performance will be lost, and performance will return to the original level.

4.2 Different types of training

Another important point is that it takes longer for the body to recover the harder and longer we train. However, different body systems also have different recovery time frames, from a few minutes for creatine phosphate, a day for glycogen replenishment and up to several days for connective tissues and protein structures to be built. The specific component of physical conditioning that we are training and therefore which of these systems needs to recover will influence what and when our next session is likely to be.

The four main types of training are: General Conditioning, Strength Training, Strength Endurance Training and Endurance Training.

4.3 The perceived fatigue scale and training guidelines

The Levels of pump on the perceived fatigue scale shown below:

Type of Training	Levels	Pumped Feeling
Endurance = Aerobic	L1	No pump Climb all day at this intensity
	L2	Slight pump No need to shake out
	L3	Moderate pump Shake out perhaps once
Strength & Power = Anaerobic Endurance	L4	Very pumped Need to shake several times
	L5	Extremely pumped Fully boxed and close to coming off

You can control the intensity by using the **PERCEIVED FATIGUE SCALE** numbered 1 - 5. The intensities over which endurance adaptations take place cover L1 to L3. By varying intensity, number of moves per set and rest time you can formulate a range of training protocols which will bring about the desired adaptations across the spectrum of endurance activity.

A key point here is to highlight that in order to avoid overtraining then it is important to stick to the prescribed level as each level has a recommended number of moves associated with it. Also be mindful that these levels are individual to each climber depending on their performance and conditioning level. The same climber might be level 2 for one climber and level 5 for another.

Training Composition

- BASE training phase
 - 70% Endurance
 - 20% Strength/Endurance
 - 10% Strength
- COMP training phase
 - 20% Endurance
 - 60% Strength/Endurance
 - 20% Strength
- Lower intensity, large number of moves
- Higher intensity, less moves (70-50% taper, of base phase)

The table showing the correlation between the number of moves in a training phase for different abilities is introduced.

Regular onsight route Grade	Total Number of Moves per week	Number of 25 move routes per week	Number of moves based on 70 -20-10 split per week		
			Endurance L2/3 Pump	Strength Endurance L4/5Pump	Strength /bouldering
6a	500	20	350	100	50
6c	750	30	525	150	75
7a	1250	50	875	250	125

Regular onsight grade is 9 out of 10 times you'd expect a climber to get up a route first go. Be aware that for children being smaller than those that have set the routes that they might simply fail due to reach so you need to factor this in otherwise their regular onsight grade will be too low.

5. Practical Examples

5.1 General Conditioning

General Conditioning- additional exercises to work antagonistic muscles and also to develop core strength / body tension for climbing.

- Core
- Flexibility

General Guidance:

- Warm Up first
- **Quality not quantity**
- Needs quiet area with mats or rubbercrumb tiled area away from other people climbing
- Do the exercises when fresh, ideally an extension of the Warm Up

Exercises need to be :

- Climbing relevant
- Fun
- Challenging for the group and individual
- **Carried out correctly**

Exercises (include pictures here)

For each exercise carry out a demo, describe the do's and don'ts

Have a go in pairs, short duration of perfect exercises. Repeat three times for all exercises

Plank

Superman

Pat Downs / Hundreds / Dish

Reverse Dish / Sky Diver

Crunches

Flexibility exercises

Flexibility is an important strength greatly overlooked by many climbers that, if increased, will lead to improved climbing performance.

Working on your flexibility will allow you to:-

- Make high steps between footholds
- Remain close to the rock when stepping up
- Make strenuous bridging positions
- Use Egyptians efficiently
- Make use of your full reach
- Able to use your maximum strength through the full joint range

Basically, with increased flexibility you will be able to climb more efficiently, take more weight off your arms and so be able to climb harder!

Below are three stretching exercises to improve your leg/hip flexibility that if used will have a direct benefit on your climbing performance. Hold the stretch for twenty seconds so it can be felt with some discomfort (not pain). Repeat four times. They can be included in any warm up or warm down.

- High stepping: Face the wall, about half a meter away. Lift your leg onto a hold without assistance from your hands (active flexibility of hamstrings). Lean gently towards the wall until you feel the stretch on the front of the hip/thigh of the straight leg and/or buttock of the bent leg (passive flexibility).
- Bridging: Stand sideways to the wall and lift one foot onto a foothold keeping both legs straight (active). Bend sideways trying to touch your raised foot without bending your knee until you feel the stretch in your inner thigh (passive).
- Frogging: Stand with knees slightly bent and feet turned out about a foot apart. Squat down keeping heels on the ground and turning the knees out until you feel the stretch on both inner thighs (passive). You can increase the stretch by pushing your elbows against your knees.

All these stretches should be completed either after climbing or in stand alone flexibility sessions. They should all be held for 20 seconds with a max of 4 repeats.

Pictures and article to be included in the Fundas 3 E-Pack

5.2 Strength Training

Strength Training - performing moves close to maximum level

- Designing activities to improve strength
- bouldering / performing moves close to maximum level

General Guidance:

- Warm Up thoroughly 15- 20 minutes
- Wall needs to not too hot or too cold.
- Problems need to be sustained not one move 'specials'
- Problems need to be 'friendly' not with tweeky holds
- Be aware of repetitive strain on certain moves.
- Avoid any problems you are concerned will cause injury.
- Climbs need to arm / finger climbing not requiring intricate footwork
- Have good landing areas, easy down climbs.

An Example Exercise

Split the group into small groups of 3 or 4 maximum, try to have climbers of similar ability.

Each group designs two problems of 8 to 10 moves long. Mark up with Gaffa Tape or coloured chalk. (Tape better)

These need to be near to the client's bouldering limit, avoid one move wonders, or anything too footy.

Talk through with the groups the desired level e.g. if a client currently climbs V3, then a V4 boulder problem will achieve the aim of strength gains. Ask the groups to set an arbitrary level of difficulty agreed by the group. The level needs to be within the level of the group i.e. there is little point in V2 climbers setting V5 problems as they will not understand what V5 is like.

One problem should be vertical or slightly overhanging (fingery) and the other one overhanging (fingers back and arms). Problems need to require the client to 'pull' hard throughout.

Each group then tests the other group's boulder problem giving feedback as to whether it will achieve the necessary aim of strength gain. To achieve strength gain boulder problems should be achievable within a handful of attempted (not possible to onsight) and climbed up to 3 or 4 times with complete recovery between attempts.

At the end clients should not feel pumped, rather a sense of being powered out or simply unable to do the moves.

Pull ups

Discuss with the group the value of pull ups (especially to be used in a group situation. Then discussion around:

- How to teach pull ups to people who can't do them (using a chair)
- How to make pull ups harder for those people who can already do them (typewriters, frenchies, encores, fast ones, slow ones etc etc)

5.3 Strength Endurance Training

Strength Endurance - working the body above the anaerobic threshold (L5 pump)

A discussion of a strength endurance work out will take place. You will not always have time to include the exercise for everybody though it may be possible for one person to be used to show an example if time allows.

General Guidance

- Warm Up thoroughly
- High quality work out
- Wall not too hot or cold and free to get on routes as required
- Routes need to be sustained with no tweaky moves or trick sequences
- Could be done on circuits on a bouldering wall but need to add clips

An Example Exercise

Find two routes that are overhanging, around 15 to 30 degrees and between 25 and 30 moves long on the same line.

One route to be a full grade below your client's regular onsight grade and the other is to be a single grade above your client's regular onsight grade.

If your client's regular onsight grade is 6c then a 6b and sustained 7a would be ideal.

The client leads the route a grade above their regular onsight grade to the top (eg the 7a), if they fall they get straight back on.

They then reverse the route a grade below their regular onsight grade (eg the 6b) or just reverse using everything coming back down and then top rope back up the route one grade above their regular onsight grade (eg the 7a). On the top rope ascent they need to stop at each clip for 5 seconds and they should fail close to the finish of the second lap for the second time.

They would have a 15 minute break and repeat 3 times in a session.

This takes time to sort out the correct routes and grades for each climber unless you are super familiar with the wall.

5.4 Endurance Training

Endurance Training - working the body aerobically (L2/3 pump) for a long period of time

Sessions to improve endurance

General Guidelines

- Warm Up thoroughly
- High quality work out
- Wall not too hot or cold and free to get on routes as required
- Routes need to be sustained with no tweeky moves or trick sequences
- Need to know regular onsight grade
- Gently overhanging routes

An Example Exercise

Select 2 routes of 4 grades below your regular onsight grade, i.e. climbs you would get up 9 out of 10 times first go. E.g. if your regular onsight grade is 7a then the correct grade for this exercise is 6b. Lead each route twice, pulling the rope down after each repetition. The routes should be between 25 and 40 moves long and gently overhanging. This is one set of 4, you repeat this 4 times, (this is commonly known as 4x4's)

Typically the action of pulling the rope down and lowering from the top of the wall gives you approximately 1 minutes rest between each rep.

You want to have 15-20 minutes rest between sets, this is normally the time it takes your partner to complete a set.

The most common mistake is for people to try this exercise at too higher grade and then fail, if performed correctly you should only have an L2/3 pump at the finish, and be able to carry on!

Do only two sets of this not 4 or you will run out of time, you can adjust the second set if the first set was too hard.

6. Weekly Session Plans

6.1 Examples of weekly session for different groups.

Based on the information give out during the day the groups will reconvene and put together some ideas around training plans for different groups, this will then be discussed as a conclusion to the day.

- Putting your own sessions together

The group will be split into 2 or more groups and given an example of a client / client group to design a training programme for. You are not looking to have a complete cycle but to see if each group can pick out points based on what they have learnt during the day.

Three examples are:

Case study 1

You have a private client 35 year old female who climbs 6b+ and wants to climb 7a.

She currently regularly onsights boulders V3 and she has been climbing for 4 years, she has neat technique but 'pumps' out 5 moves from the top of routes of 6c on lead. She climbs for 2 hours 3 times a week and has access to bouldering and routes.

This one hour session on a roped wall per week.

Case Study 2

You have an adult's improver's class. They are on a six week course.

They are 6 people of mixed ages and abilities but lead 4+- 6a routes and boulder V0- V3max

This is a one hour session on the bouldering wall.

They are looking at developing their finger, arm and back strength.

Case Study 3

You have a group of 6 children in a climbing academy.

Ages 9-14 years Climbing grades 6b-7b routes V2-V5 boulders

Typical Academy Member: own their own rock shoes, harness, chalk bag, they climb 2-5 times per week, love climbing and want to improve, they take part in BMC YCS and other comps etc.

1. For the case studies the following questions will help guide people: What do you think this person's weaknesses are?
2. What kinds of sessions would you suggest for this person?
3. Would certain sessions be more important than others?
4. What would a weekly split of sessions (endurance, strength etc) look like?
5. As well as physical training sessions, are there any other areas this person could work on?

Questions and Review